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Proposed Cuts to Air Traffic Control Towers Under Budget Sequestration: Background and Considerations for Congress

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Summary

Budgetary flexibility enacted under the Reducing Flight Delays Act of 2013 (P.L. 113-9) has permitted the Federal Aviation Administration (FAA) to cancel plans to close 149 air traffic control towers operated by contractors, a measure it had proposed to address funding decreases brought about by the budget sequester. On March 22, 2013, FAA announced the planned tower closures. The closures were originally planned for April 2013, but the closure was pushed back to June 2013 and then abandoned due to receipt of new authority in P.L. 113-9 allowing funds to be transferred from other FAA accounts to FAA operations. FAA had also named 72 air traffic control facilities that would cease operations late at night as a cost-saving measure, but elimination of FAA controller furloughs subsequent to passage of P.L. 113-9 led FAA to cancel these plans as well.

Roughly 10% of U.S. airports have operating control towers, although many towers close at night when flight activity is low. Closure of a tower does not mean closure of an airport: At airports where no tower is operating, pilots use established traffic patterns and procedures to avoid other aircraft. The towers that were slated for closure have no radar approach control capabilities and perform air traffic separation functions using procedures for visual flight. These airports can handle aircraft in poor weather on a limited basis, but unlike airports with radar approach control they cannot handle multiple aircraft on approach in low visibility and clouds.

About half of the roughly 500 towers in the United States are operated by private firms under contract to FAA. Sixteen of the contract towers are partially funded through local (non-federal) shares of up to 20%, while 235, including the 149 identified for closure, have been fully funded by FAA. The cost-share towers are currently partially funded through a separate federal appropriation that is subject to the 5.3% sequester cut, but they were not slated to be closed in FY2013. A tower scheduled to close could be converted to a non-federal tower if a local community were willing to fully fund the tower's operation. Non-federal towers are still regulated, but not funded, by FAA.

FAA has historically relied on a benefit-to-cost ratio methodology for establishing and discontinuing air traffic control tower operations. This methodology quantifies the safety and efficiency benefits of a tower in reducing aircraft collisions and other accidents and reducing flight times, and identifies established towers for possible closure or conversion to cost-share or non-federal towers if their benefit-to-cost ratio falls below one. However, all towers identified for closure under the sequestration cuts have benefit-to-cost ratios greater than one. Long-term tower closures would have relatively small but measureable impacts on safety and efficiency, and could cause a shift in both commercial and general aviation traffic to busier airports where towers remain open, depending on how airlines and other aircraft operators respond.

Legislation to maintain federal control tower funding and a measure to increase tower staffing at busy airports are under consideration in the 113th Congress. S. 687 would prohibit the closure of any air traffic control tower in FY2013 and FY2014. S.Amdt. 45 had sought to maintain funding for the FAA contract towers to prevent their closure, but was not considered on the floor in the Senate. H.R. 66, pending in the House Transportation and Infrastructure Committee, would increase staffing minimums for towers at busier commercial airports, which could put additional fiscal pressures on FAA to close low-activity towers or reduce their operating hours.

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Budget Sequester and Air Traffic Control

The Budget Control Act of 2011 (P.L. 112-25) provided for automatic reductions to most federal discretionary spending if no agreement on deficit reduction was reached by the Joint Select Committee on Deficit Reduction. Such reductions, referred to as sequestration, went into effect on March 1, 2013, the extended deadline for a deficit reduction agreement established under the American Taxpayer Relief Act of 2012 (P.L. 112-240). In general, sequestration required agencies to reduce non-defense discretionary spending by 5.3% in FY2013.[1]

Sequestration affects Federal Aviation Administration (FAA) operations in different ways. FAA's grants for airport improvements, which are subject to obligation limitations, were statutorily exempt from the sequester cuts.[2] On the other hand, FAA's air traffic operations face significant spending reductions. In total, it is estimated that FAA will need to reduce its total funding by roughly $636 million in FY2013 compared to FY2012 enacted levels, with roughly three-quarters of this amount coming from FAA operations, primarily air traffic and aviation safety functions.

In anticipation of the sequester cuts, Transportation Secretary Ray LaHood and FAA Administrator Michael Huerta issued a joint letter on February 22, 2013, announcing cost-cutting measures under consideration including furloughs for most FAA employees, elimination of late-night shifts in as many as 72 air traffic control facilities, and the complete closure of up to 238 control towers at airports that have fewer than 150,000 flight operations or fewer than 10,000 commercial operations per year.[3] Towers listed as candidates for closure included 195 run by contractors under the Federal Contract Tower (FCT) program and 43 staffed by FAA controllers.

On March 22, 2013, FAA announced it would close 149 FCT program towers over four weeks beginning April 7, 2013. FAA said it chose to keep open 24 FCT facilities initially identified for closure after weighing national security interests; adverse economic impacts beyond the local community; potentially significant impacts on interstate transportation, communication, or banking and financial networks; and status as a critical diversionary airport for a large hub airport. On April 5, 2013, citing a need for additional time to address multiple legal challenges to its tower closure decisions, FAA delayed the closures and set June 15, 2013, as the date it would cease funding the 149 FCT program towers. Several airports have filed suit against FAA, chiefly questioning whether it has adequately met legal obligations to evaluate potential safety risks associated with the pending tower closures.

On May 1, 2013, following a week of FAA air traffic controller furloughs that contributed to some isolated air traffic system delays, particularly at the nation's busiest airports, the Reducing Flight Delays Act of 2013 (P.L. 113-9) was enacted. The act gave FAA authority to transfer up to $253 million to FAA operations using available monies from unspent airport funds, which were not subject to sequestration, and from other available sources within FAA.[4]

On May 2, 2013, a bipartisan group of 25 Senators transmitted a letter to Secretary of Transportation Ray LaHood and FAA Administrator Michael Huerta. The letter indicated that the

[1] See CRS Report R42972, *Sequestration as a Budget Enforcement Process: Frequently Asked Questions*, by Megan S. Lynch.

[2] See CRS Report R42050, *Budget "Sequestration" and Selected Program Exemptions and Special Rules*, coordinated by Karen Spar.

[3] See Federal Aviation Administration, "FAA Planning for $600 million in 2013 Spending Cuts," available at http://www.faa.gov/news/updates/?newsId=71078.

[4] For further discussion see CRS Report R43065, *Sequestration at the Federal Aviation Administration (FAA): Air Traffic Controller Furloughs and Congressional Response*, by Bart Elias, Clinton T. Brass, and Robert S. Kirk.

$253 million transfer authority was "far above the amount required to prevent furloughs," stressing further that "[c]ongressional intent is clear: the FAA should prevent the slated closure of 149 contract towers by fully funding the contract tower program."[5] On May 10, 2013, Secretary LaHood announced that the funds transfer authority under P.L. 113-9 was sufficient to end FAA employee furloughs and keep the 149 towers open for the remainder of FY2013.[6] While this action appears to have settled debate over the pending closure of control towers in FY2013, long-range plans for tower closures, cutbacks in operating hours, or both may be revisited in future policy debates regarding the FAA budget. The financing and continued operation of low-activity towers, in particular, remain significant issues for future FAA budgets.

Air Traffic Control Towers and Their Function

Out of more than 5,000 public-use airports in the United States, slightly more than 500 (roughly 10%) have control towers. Many towers at small and medium-sized airports close during late-night hours when there is little flight activity. Slightly less than half of all towers are operated by private firms under contract to FAA. Towers at small airports and at some medium airports do not have radar approach control capabilities, and controllers' primary air traffic separation responsibilities are carried out under procedures for visual flight using sequencing and visual spacing instructions and takeoff and landing clearances to pilots. Airports with non-radar towers can handle aircraft in poor weather on a limited basis, and some have specialized approach procedures for flights using onboard avionics or "instruments." However, as the tower cannot provide separation for these aircraft, typically only one aircraft at a time is allowed to be on an instrument approach when visibility and cloud cover are below minimums specified for visual flight conditions.

All towers operated by contract controllers are non-radar towers. Towers at busy airports are operated by FAA employees and rely on radar to provide separation between aircraft operating on instruments when visibility is reduced. Radar capabilities allow these towers to handle multiple aircraft flying on instrument approaches, thus permitting a high volume of flights even in poor weather conditions.

Air Traffic Control Tower Funding

In general, the funding and operation of civil air traffic control towers in the United States and U.S. territories fall into one of four categories: (1) tower operations funded through FAA's operations budget and staffed with federal air traffic controllers; (2) contract tower operations fully funded through FAA's operations budget but staffed with controllers employed by the contractor under the federal contract tower (FCT) program (also known as the contract tower base program); (3) contract tower operations partially funded through the FAA's operations budget and partially funded by local or state government funding and managed and staffed by contractor personnel, referred to as the contract tower cost-share program; and (4) non-federal control towers that receive no funding from the federal government and are staffed with non-federal controllers.[7] Regardless of funding and operation, FAA maintains responsibility for the regulation and oversight of operations and safety at all civil air traffic control towers in the United States.

[5] Letter from The Honorable Richard Blumenthal, The Honorable Jerry Moran, and The Honorable Kelly Ayotte, United States Senate, et al. to The Honorable Ray LaHood, Secretary, U.S. Department of Transportation, and The Honorable Michael Huerta, Administrator, Federal Aviation Administration, May 2, 2013.

[6] U.S. Department of Transportation, *Statement from the U.S. Department of Transportation*, DOT-44-13, May 10, 2013, available at http://www.dot.gov/briefing-room/statement-us-department-transportation.

[7] In addition to these categories, there are a few civilian airports where the Air National Guard (ANG) contracts for tower services during periods of ANG flight operations.

Contract towers and contract controllers must be certified by FAA and must follow FAA directives.[8]

FAA funds for tower operations are derived from appropriations to the FAA's Operations and Maintenance (O&M) account, which is funded partially from the Airport and Airways Trust Fund (AATF) and partially from the Treasury general fund. These sources provide funding for both the contract tower program and FAA-staffed towers.

The Contract Tower Program

Of U.S. airports with control towers, 251 (slightly less than half) are operated by private firms and staffed with contract employees under the FCT program. Sixteen of the 251 contract towers are funded under arrangements in which local governments or entities pay up to 20% of the costs. The cost-share program is provided as an option to communities that wish to retain an operating air traffic control tower after FAA determines that the costs to the federal government outweigh their tower's benefits related to safety and efficiency of flight operations. With the exception of these 16 cost-share towers, towers in the federal contract tower program are fully funded by FAA. In recent years, the budget for the FCT program has been about $140 million annually, including approximately $10 million for the federal share of cost-share towers.

The FCT program came into existence in 1982—initially as a pilot program at five airports—in an effort to provide air traffic services at low-activity towers in the wake of the nationwide air traffic controller strike and subsequent dismissal of striking FAA controllers. For the first 12 years, the program remained relatively small, growing to 27 towers by 1993. Nonetheless, it gained the attention of Vice President Gore's National Performance Review—later known as the National Partnership for Reinventing Government—which endorsed the program in 1993 and recommended its expansion.[9] The FAA developed a plan to close or contract out all low-activity towers, and the number of contract towers grew to 160 by the end of FY1997.[10]

In FY1999, Congress first funded the cost-sharing program, allowing airports that would not otherwise have met FAA's threshold benefit-to-cost ratio to maintain contract tower operations with non-federal funds to supplement federal expenditures. Subsequently, Congress has limited the local share to not more than 20% of a tower's costs. Currently 16 towers are funded through this program at a cost of roughly $10 million annually. The federal funding for cost-share towers has been designated separately in recent appropriations measures, and therefore is not included in the proposed funding cuts and tower closures being considered in FY2013. However, FAA has indicated that it would seek to increase the local share portion of the cost-share program in FY2014 from 20% to 50%. While this could expand program eligibility, it could also have the effect of triggering tower closures in communities that are unwilling or unable to contribute additional funding for tower operations.

In a 2012 audit, the Department of Transportation Office of Inspector General concluded that the FCT program provided air traffic services to low-activity airports at lower costs than FAA-staffed towers could. The audit found that, on average, contract towers required six fewer controllers and

[8] Federal Aviation Administration. Federal Aviation Administration (FAA) Contract Tower (FCT) Program. Contract Services Branch (ATO-310).

[9] Vice President Albert Gore's National Performance Review. "From Red Tape to Results: Creating a Government that Works Better and Costs Less." September 7, 1993. Government Printing Office: Washington, DC.

[10] Department of Transportation, Office of Inspector General. *Federal Contract Tower Program, Federal Aviation Administration*, Department of Transportation, AV-1998-047, Washington, DC, May 18, 1998.

cost almost $1.5 million less annually than FAA-staffed towers at airports with comparable levels of flight activity.[11] These savings were achieved through lower staffing levels and lower controller pay at contract towers compared to FAA towers. The audit found that contract towers had a lower rate of reported safety incidents than comparable FAA towers. Also, a survey of aircraft operators, conducted as part of the audit, found similar levels of satisfaction with the services provided by contract towers and FAA towers handling similar numbers of aircraft.

Low-Activity FAA Towers

The FAA operates 262 airport air traffic control towers. About one-quarter of these are similar in activity levels to contract towers. These have remained under FAA operation primarily because of local operational considerations, such as proximity to congested airspace, or are considered candidates for conversion to the FCT program, but have not yet been converted. Of the FAA-operated towers, 43 have been identified as having fewer than 150,000 total operations or fewer than 10,000 commercial operations annually and have been included on the list of potential tower closures.

FAA Towers Where Elimination of Late-Night Shifts Have Been Proposed

Additionally, several FAA-staffed towers at mid-sized airports had been identified as facilities where late-night shifts could be eliminated in FY2013. Several of the towers listed have radar approach capabilities. However, these towers typically see limited late-night activity, comprising mainly all-cargo operations with occasional general aviation traffic. Examples include the towers at Little Rock, AK; Manchester, NH; Oklahoma City, OK; Harrisburg, PA; Reno, NV; El Paso, TX; and Norfolk, VA. Many other towers, including both FAA-operated and contract towers, already close during late-night hours.

Effects of Tower Closures

When a tower closes, either overnight or permanently, the airport will typically remain open to traffic as an uncontrolled airport. In some rare instances, an uncontrolled airport may close late at night for noise abatement or due to safety concerns in mountainous areas, but runway lights and other navigational aids remain functional so it could serve as an emergency landing site for an aircraft in distress. When an airport is uncontrolled, pilots assume responsibility for following prescribed traffic procedures and seeing and avoiding other aircraft, both on the ground and in flight in the vicinity of the airport.

FAA's Benefit-to-Cost Methodology

Historically, FAA has relied on a formal benefit-to-cost assessment process for establishing and discontinuing air traffic control tower operations.[12] This analysis weighs the monetized lifecycle safety and efficiency benefits derived from operating a tower against the lifecycle costs of operating and maintaining it. The analysis yields a single benefit-to-cost ratio which serves as

[11] Department of Transportation, Office of Inspector General, *Contract Towers Continue to Provide Cost-Effective and Safe Air Traffic Services, But Improved Oversight of the Program Is Needed*, Department of Transportation, AV-2013-009, Washington, DC, November 5, 2012.

[12] The criteria for economic analysis of tower benefits and costs are prescribed in 14 CFR 170.13 and 170.15 and documented in FAA-APO-90-7, *Establishment and Discontinuance Criteria for Airport Traffic Control Towers*.

FAA's criterion for determining whether a tower should be established or discontinued: If the ratio is greater than or equal to one, a recommendation to establish a tower may be made, whereas if the ratio falls below one, an existing tower would be subject to closure, to continuation under the cost-share program, or to conversion to a non-federal control tower if a local entity is willing to assume the costs.

Currently, all airport towers in the contract tower program have benefit-to-cost ratios greater than or equal to one under FAA's valuation methodology, except for the 16 cost-share towers where local communities contribute to fund costs that outweigh the benefits, up to 20% of the total cost. Communities may identify other benefits derived from the operation of the tower, such as attracting business, that are not considered in FAA's benefit-to-cost ratio. The U.S. Contract Tower Association, a trade organization representing contract towers, has been critical of FAA's benefit-to-cost analysis methodology, claiming that it fails to consider many intangible benefits, including local economic benefits derived from maintaining an airport tower.[13] On the other hand, the FAA methodology also ignores certain disbenefits that may arise from operation of a tower, such as increased community noise from additional aircraft attracted because of the tower's presence.

Despite the criticisms, the established FAA methodology continues to serve as a basis for quantifying a tower's added value or benefit to aviation safety and operational efficiency. These econometric valuations can be used to quantify the effects of tower closures based on the levels of flight activity at affected airports. FAA compares benefits derived from operation of an existing tower against the costs of operating and maintaining it over a 15-year span. The quantified benefits include prevention of collisions between aircraft, prevention of other accidents, and benefits from reduced flight time. These benefits are considered in further detail below in the context of potential impacts associated with tower closures.

Effects on Aviation Safety

The FAA's tower benefit safety analysis is predicated on projections that the presence of a tower will prevent, on average (mean value), the following number of accidents over a 15-year span as a function of the average annual number of flight operations:[14]

- 1.802 x (Number of Operations/10^6)^2 midair collisions (both aircraft airborne);
- 1.238 x (Number of Operations/10^6)^2 collisions between an aircraft on the ground and an aircraft in flight; and
- 2.775 x (Number of Operations/10^6)^2 ground collisions between aircraft.

As these equations indicate, collision risk is projected to increase exponentially (as a function of operations squared) as the number of airport operations increases. Therefore, the busier an airport is, the more significant a control tower's role in collision risk reduction. Closing 100 towers with 150,000 annual operations each would be expected to increase the number of collisions over the 15-year span by roughly 13, or slightly less than 1 per year.

The likely severity of injuries and aircraft damage differ among accident types, with midair collisions being far more likely to result in fatalities and destruction of aircraft. Most accidents

[13] U.S. Contract Tower Association, *Elimination of the Use of APO-90-7 Benefit/Cost Analyses for the FAA Contract Tower Program*, Alexandria, VA, February 2009.

[14] While FAA calculates mean values for determining whether to establish a tower at a non-towered airport, it uses a more conservative criterion of the 95% confidence interval upper bound for determining benefit-cost ratios for existing towers.

are minor, except among midair collisions, which pose greater than a 50% chance of fatality. It is estimated that, among all accidents that might be prevented by the operation of a tower, about 18% of aircraft occupants will be fatally injured.

Other types of accidents that can be prevented by the presence of tower controllers include wheels-up landings, collisions with objects such as construction equipment, downwind landings, misaligned approaches, and runway overshoots and undershoots. From 1983 through 1986, these types of accidents occurred at nearly twice the rate at non-towered airports (2.583 accidents per million operations) than at towered airports (1.398 accidents per million operations). By adding these other accident classes into the analysis, the presence of an operational control tower would reduce total accident risk (collisions between aircraft plus other accidents) by roughly one mishap for every 2.14 million operations.

The collision likelihoods in the FAA benefit-to-cost methodology are based on accident data from 1983 through 1986. Accident rates for both general aviation and commercial aviation have declined since that time, so the FAA methodology likely overestimates present-day collision probability and severity.

Effects on Operational Efficiency

At airports without operating control towers, pilots often overfly the field to assess conditions before landing and follow an established traffic pattern to conform to traffic management practices. Towers provide operators with efficiency gains by reducing flight time and the associated fuel burn associated with these practices. The operation of a tower typically reduces flight time by less than one minute per flight, with less of an effect on commercial aircraft than on general aviation aircraft. While the impact of tower closures on individual operators' efficiency is relatively small, tower closures can also be viewed as having a negative cumulative impact on energy and the environment by increasing aircraft fuel burn, emissions, and noise as a result of these extended flying times, assuming flight activity remains constant after closure of the tower.

Possible Long-Term Effects on Aircraft Operations

Tower closures could affect airlines in terms of their receipt of required information regarding current airport data and weather information that they must obtain from approved sources. A tower closure would not preclude commercial air service, but it could affect airlines' decisions regarding whether to reduce or eliminate service to an airport. Also, tower closures may affect private and business aircraft operators' decisions regarding where to base and to operate their aircraft, and could result in the diversion of some general aviation traffic from designated reliever airports to busier commercial airports. If this were to occur, it could increase commercial airline delays at certain airports. The Aircraft Owners and Pilots Association (AOPA), an advocacy group for general aviation interests, asserts that "in and near metroplexes, towers at smaller airfields provide a measure of relief to larger airports serving commercial traffic. Closing such towers will impact the entire metroplex."[15]

[15] Letter from Craig L. Fuller, President and CEO, Aircraft Owners and Pilots Association, to The Honorable Michael Huerta, Administrator, Federal Aviation Administration, March 11, 2013, http://www.aopa.org/advocacy/articles/2013/pdfs/1303012letter-to-huerta.pdf.

Possible Technology Remedies to Potential Safety Impacts

The potential safety impacts of long-term tower closures could be mitigated to some degree by technologies now under development. These technologies fall into two broad categories: (1) in-cockpit situation awareness technologies and (2) remote air traffic services.

In-Cockpit Situation Awareness Technologies

In-cockpit situation awareness technologies include capabilities such as moving maps and cockpit displays of traffic information. While commercial passenger aircraft are equipped with traffic collision avoidance systems (TCAS), such systems are not affordable for typical general aviation aircraft, which make up the majority of traffic at most small and mid-sized airports. A new technology known as Automatic Dependent Surveillance-Broadcast (ADS-B) may provide a means for general aviation aircraft to be equipped with in-cockpit moving maps with overlays of nearby traffic by receiving broadcast signals from other aircraft of the precise aircraft location, typically determined by global positioning system (GPS) tracking.

FAA will require most aircraft to be equipped with the ADS-B capability to broadcast precise location information, a capability known as ADS-B Out, by 2020. However, at present there is no mandate to equip aircraft with the capability to receive and display information about other traffic, a capability known as ADS-B In. While some general aviation operators may see an inherent safety benefit in this capability to improve situation awareness, greater participation may be needed to obtain a comparable level of situation awareness and traffic avoidance in the air terminal environment that is currently provided by manned air traffic control towers.

Remote Air Traffic Services

Another potential remedy is to provide air traffic services similar to those currently provided by towers from remote locations. Remote facilities could potentially realize cost savings over existing stand-alone towers by centralizing and consolidating operations among low-activity airports. However, initial start-up costs may be high.

Some air traffic services are already provided remotely. For example, an aircraft on an instrument approach to a non-towered airport can remain under the control of an en route or approach control facility until it descends below radar coverage. While under radar control, the controller would remain responsible for maintaining aircraft separation from other aircraft flying under instrument rules and may provide advisories regarding aircraft operating in or near the airport traffic pattern under visual flight rules.

Remote or virtual towers are seen as a potential next step in air traffic facility consolidation and could provide a comparatively low-cost alternative to manned towers. Remote towers could utilize data such as ADS-B and surface radar capabilities. Cameras and other sensors, such as infrared for night operations, could be installed at airports without operating towers to provide information to consolidated air traffic facilities, from which controllers could provide services similar to those airport towers currently provide. Pooling of resources at these consolidated facilities could potentially allow for significantly reduced staffing compared to stand-alone towers currently in operation.

European researchers have initiated a project to develop and examine the potential benefits of expanding remote air traffic service capabilities at test sites in Norway and Sweden and are

working toward full operational certification of remote tower facilities.[16] Also, AirServices, the nationwide air traffic services provider in Australia, is testing remote approach control and airport services at Alice Springs from a remote tower center in Adelaide.[17] In the United States, both the National Aeronautics and Space Administration and the Department of Transportation's John A. Volpe National Transportation Systems Center are conducting research on staffed "virtual towers" and remote tower sensing capabilities.[18] Field tests at U.S. airports are currently under consideration, but it appears unlikely that remote or virtual air traffic control tower facilities will be ready for routine operation at U.S. airports in the near future.

Related Legislation

S.Amdt. 45, amending H.R. 933, the vehicle for consideration of an FY2013 continuing budget resolution, was submitted on March 13, 2013, with the purpose of limiting FAA tower closures in response to budget sequestration. Specifically, the amendment would fund the contract-tower program for FY2013 at a level of $130.5 million with $10.35 million for the cost-sharing program. The amendment would offset the continued funding of the contract tower program at this level by rescinding $24 million of unobligated prior-year funds appropriated for FAA facilities and equipment and $26 million of unobligated prior-year funds for FAA research, engineering, and development. The measure would not protect contract towers from budget reductions beyond FY2013 and does not address possible closures of FAA-staffed towers. On March 20, 2013, the Senate passed an amended version of H.R. 933 that did not include the language of S.Amdt. 45 regarding funding for the contract tower program.

Subsequently, S. 687 was introduced on April 9, 2013. It would explicitly prohibit FAA from suspending or terminating operation of any FAA air traffic control tower that was operational on March 1, 2013, in either FY2013 or FY2014. Further, it stipulates that if FAA suspends or terminates any tower operations between March 1, 2013, and the date of enactment, FAA shall resume operations of such tower as soon as practicable.

Prior to the announcement of pending tower closures in response to sequestration, legislation was offered seeking to increase tower staffing, particularly during late-night shifts. The Minimum Staffing of Air Traffic Controllers Act of 2013 (H.R. 66) would require a tower to be staffed with a minimum of two air traffic controllers at all times at all airports where there are regular air carrier operations. The legislation appears to address concerns over fatigue among air traffic controllers during midnight shifts and over controller workload and operational errors, and is not directly related to budget reductions in tower operations. Due to budget limitations, a requirement for additional staffing at certain towers could result in a larger number of towers closing.

[16] SESAR Joint Undertaking, "Remote and Virtual Tower Project," SESAR Magazine, Issue #7, March 2012, p. 4, Brussels, Belgium; Aimee Turner, "Remote Towers Near European Certification," Air Traffic Management.net, October, 29. 2013, available at http://www.airtrafficmanagement.net/2012/10/remote-towers-near-european-certification/.

[17] "Remote Tower Technology," *AirServices* (Australia), available at http://www.airservicesaustralia.com/projects/remote-tower-technology.

[18] U.S. Department of Transportation, Research and Innovative Technology Administration, Volpe National Transportation Systems Center, "FAA Staffed Virtual Tower" in *Volpe Center Highlights*, January 2008; Richard Papasin, Yuri Gawdiak, and David A. Maluf, et al., *Airport Remote Tower Sensor Systems*, National Aeronautics and Space Administration, Ames Research Center, 2001-01-2651, Moffett Field, CA, 2001.

Author Information

Bart Elias
Specialist in Aviation Policy

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